

Notice of Allowability

Application No.

10/618,938

Examiner

Ling-Siu Choi

Applicant(s)

LIU, JIA-CHU

Art Unit

1713

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☐ This communication is responsive to the Amendment filed February 11, 2004.
2. ☐ The allowed claim(s) is/are 1,2 and 4-23.
3. ☐ The drawings filed on _____ are accepted by the Examiner.
4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some* c) ☐ None of the:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
6. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
- (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
- 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
- (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
7. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

- | | |
|---------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| 1. <input type="checkbox"/> Notice of References Cited (PTO-892) | 5. <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 2. <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 6. <input type="checkbox"/> Interview Summary (PTO-413),
Paper No./Mail Date _____ |
| 3. <input type="checkbox"/> Information Disclosure Statements (PTO-1449 or PTO/SB/08),
Paper No./Mail Date _____ | 7. <input checked="" type="checkbox"/> Examiner's Amendment/Comment |
| 4. <input type="checkbox"/> Examiner's Comment Regarding Requirement for Deposit
of Biological Material | 8. <input checked="" type="checkbox"/> Examiner's Statement of Reasons for Allowance |
| | 9. <input type="checkbox"/> Other _____ |

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DETAILED ACTION

1. This Office Action is in response to the Amendment filed February 11, 2004. Claim 3 was canceled and claims 1-2 and 4-25 are now pending, wherein claims 24-25 have been withdrawn from consideration.

Examiner's Amendment

2. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Mr. Shao-Hua Guo on March 31, 2004.

3. The application has been amended as follows:

Cancel claims 24-25 without prejudice;

Claim 19, line 5, change "a supported transition metal complex" to --a supported Group 4 transition metal complex.

Allowable Subject Matter

4. Claims 1-2 and 4-23 are allowed.

5. The following is an examiner's statement of reasons for allowance:

The present claims are allowable over the closest references: Ozawa (JP 2001-253909) and Nagy et al. (US 5,637,660).

The present invention relates to a process to polymerize an olefin in the presence of

(a)	a clay
(b)	an activator
(c)	a Group 4 transition metal complex having at least one pyridine moiety-containing ligand

(summary of claim 1)

Ozawa discloses a process to polymerize olefins in the presence of (a) a transition metal complex having a pyridine moiety-containing ligand, (b) an organoaluminum compound, and a clay and /or ion exchanging layered compound (summary). However, Ozawa does not teach or fairly suggest a process to polymerize an olefin in the presence of a **Group 4 transition metal** complex having one pyridine moiety-containing ligand.

Nagy et al. discloses a process to polymerize olefins in the presence of (A) a Groups 8-10 transition metal complex having a pyridine-containing ligand, (B) a cocatalyst, and (C) a support, wherein the transition metal is titanium or zirconium; the cocatalyst is methylaluminoxane (MAO), lithium tetrakis(pentafluorophenyl)borate, lithium

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tetrakis(pentafluorophenyl)aluminate, or anilinium tetrakis(pentafluorophenyl)borate; the support can be a silica gel (abstract; col. 3, lines 40-67; col. 4, lines 1-16; claims 1, 4-5). However, Nagy et al. do not teach or fairly suggest a process to polymerize an olefin in the presence of a **clay**. Furthermore, a process to polymerize an olefin in the presence of the clay other than the silica gel results in the process having a higher catalyst activity and a product having a higher weight-average molecular weight and bulk density (g/cc):

clay	polymerization conditions			catalyst activity	$M_w \times 10^{-6}$	bulk density
	temp (°C)	pressure (psig)	solvent			
yes	70	550	hexane	33,100	5.25	0.32
yes	70	550	hexane	27,300	5.14	0.32
yes	70	550	hexane	16,500	5.08	0.31
no	70	550	hexane	9,600	4.04	0.26
yes	70	550	isobutane	10,000	4.97	0.31
yes	70	550	isobutane	9,000	4.87	0.30
no	70	550	isobutane	7,800	3.99	0.26

In light of the above discussion, it is evident as to why the present claims are patentable over the prior art.

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Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ling-Siu Choi whose telephone number is 571-272-1098.

If attempt to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Wu, can be reach on 571-272-1114.

L. S. Choi

Ling -Siu Choi

March 31, 2004